Two new ferns from New England.

With some observations on hybridity and nomenclature.

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The unexpected discovery of a new (species) fern, whose characters show unmistakable evidence of hybridization, in Essex county, Massachusetts, by Mr. Raynal Dodge, of Newburyport, is of unusual interest and importance, as it opens up again the question of hybridity among the ferns, a question by no means as yet satisfactorily settled.

Unfortunately absolute proof of hybridity among ferns in nature is beyond our reach and we can only conjecture probable results, with possibility of error in our deductions. We must not assume that because one plant possesses certain characters in common with two others it is necessarily a hybrid, as fundamental structural characters alone are important. The innate tendency of ferns to vary must always be considered, for herein the explanation of many apparent differences and superficial resemblances will be found.

The number of fern hybrids is exceedingly small as it must necessarily be from the very nature of the difficulties surrounding germination even in normal directions.

Asplenium ebenoides is probably the best example of a fern hybrid that we have, the infrequency of its occurrence, the presence always of *Camptosorus* and *Asplenium ebeneum*, and the few plants found in the recorded stations, all going to favor the hypothesis of hybridization; yet even here the difficulty of demonstrating such an hypothesis is almost insurmountable.

The late Wm. H. Leggett wrote to me only a short time before his death that some efforts were being made to test the hybridity of Asplenium ebenoides, but the probabilities are, that the effort, if made, was unsuccessful, as no attempt of that kind has been recorded to my knowledge; and if that fern really derived its origin from two species separated from each other by generic distinctions, the presumption is wholly in favor of its sterility.

Aspidium Boottii is generally considered a hybrid between *Aspidium spinulosum* and *A. cristatum*, but the frequency of its occurrence has oftentimes caused me to doubt the sound-

ness of that view: it is certainly very strange that those two species should be so accommodating as to intercross in so many widely separated stations under such varying conditions and always with such nearly similar results. Besides I have more than once found A. Boottii growing so far away from one or the other of its reputed parents as to almost preclude the possibility of contact.

The fern which I here bring forward for the first time, however, was found growing under such conditions, and exhibits such unmistakable characters, that there is every probability in favor of its hybrid origin. Moreover the successful cultivation in my garden during the past year of plants transplanted from their native habitation has enabled me to watch the growth and development of this fern so closely, and my convictions in regard to it have become so strong, that I should not now expect to find it growing anywhere in nature except in close proximity to *Aspidium cristatum* and *A. marginale*, whose combined characteristics it inherits.

At the same time I recognize the possibility of parent forms dying out, or being exterminated from various causes, while a hybrid or varietal form might continue an independent existence; so that the absence of one or both parent forms from any given locality could not necessarily disprove hybridity, though it might weaken evidence for it.

In the case of the other fern which I also publish here for the first time, it might be claimed with much show of reason that it is a hybrid between *Aspidium Thelypteris* and *A. Noveboracense*, especially from the circumstances under which I found all three ferns growing on Indian Point, Georgetown, Maine; but as there are other and stronger reasons for not accepting that view I have preferred to consider it as a distinct species.

My thanks and acknowledgements are due to Prof. Daniel C. Eaton for having placed in my hands for investigation, with privilege to name and publish, the original specimens of the new hybrid which he received from Mr. Dodge; and also to Mr. Dodge for the privilege of visiting the Essex county stations for both ferns with him, and especially for the valuable critical observations on the habits and characters of both ferns subsequently sent to me by him, and to which I have been greatly indebted while making my own investigations.

In considering the question of nomenclature I have adhered to the Swartzian generic names as Swartz was the first to reduce fern genera to any kind of order, and it is better to keep

his names than to use names of only partial and doubtful application given by writers who knew very little about the subject.

I do not recognize the authority of the makers of the Rochester and Madison codes, nor can I approve of the methods by which final judgment is forestalled, and I do not consider that any one is bound by them.

I believe in the desirability of uniformity, and am ready to sacrifice my own opinions without hesitation whenever Kew and Cambridge, Paris and Berlin shall agree upon some universal basis, but until that time I prefer to be guided by the principles laid down by the illustrious de Candolle, and lately substantially reaffirmed in the recommendations made to the Botanical Section of the American Association in August, 1894, by the committee on the nomenclature of plant diseases.

The name ASPIDIUM was first used by Swartz for the whole genus very nearly as it is now understood, and it ought to be retained as there is no earlier name with the same scope and application.

However if any think otherwise and prefer to divide Aspidium into two genera they can use either Dryopteris, Nephrodium or Lastrea for the Aspidia with reniform indusia, and for the benefit of such persons I have appended to my descriptions synonyms from which they can choose whichever suits them best.

Aspidium cristatum × marginale, n. (hybrid) sp.—Rootstock caudiciform, stout, erect or sub-erect, crown central as in A. marginale, shaggy with large pale brown ovate and ovate-lanceolate scales: fertile fronds $1\frac{1}{2}$ to $2\frac{1}{2}^{ft}$ tall, 4 to 8^{in} broad across the middle of the lamina; sterile fronds one-half to two-thirds as large; stipites 4 to 12^{in} long, stramineous, strongly channelled, usually well clothed, especially below, but sometimes quite naked or sparingly scaly, with pale brown ovate-lanceolate or linear-lanceolate scales: laminæ 10 to 20^{in} long, elliptic-lanceolate narrowing both ways, the lower one-third usually with triangular ovate obtuse pinnæ as in A. cristatum, but sometimes as in A. marginale, the upper two-thirds more like A. marginale in outline with long acuminated deltoid-lanceolate or lanceolate pinnæ and narrowing gradually to the acuminate apex; pinnæ variable, sub-sessile, short-stalked, distant, approximate, alternate or opposite, 2 to $4\frac{1}{2}^{in}$ long, $\frac{3}{4}$ to $1\frac{1}{2}^{in}$ broad at base, narrowing gradually to the acuminate apices, deeply pinnatifid one-half to two-thirds of the way down with oblong or sub-falcate entire or finely serrated

divisions, the basal ones cut nearly to the mid-rib and again pinnatifid with finely toothed lobes, texture sub-coriaceous; rachis stramineous and, as well as the midribs beneath, usually scaly with minute scales and chaff; venation as in A. cristatum, but more strongly depressed on the face and sometimes with the wavy blackish midribs and veins of A. marginale: sori nearer the margins than in A. cristatum, indusia smooth, convex before maturity as in marginale, spores few.

Habitat: Borders of swamps with A. cristatum and A. marginale near the bases of rocky land congenial to the latter. Collected in Boxford, Newbury, and Merrimac, Essex county, Mass., 1892, by Raynal Dodge of Newburyport.

The principal characters by which this fern is to be distinguished from A. cristatum, for which it is most likely to be mistaken, are (1) the character of the rootstock, this having a central crown surrounded by fronds, while in A. cristatum the growth is lateral, extending beyond the fronds; (2) the broader outline of the upper two-thirds of the frond, the longer acuminated apex, and the acuminate pinnæ.

The strongest resemblances to A. cristatum are in the young and sterile fronds, but a careful observation of several plants grown on my own grounds during the past year has shown marked differences that a practiced eye will readily detect.

Mr. Dodge reports finding in August last a single plant in a swamp in Warren, Rhode Island, and it may be looked for wherever A. cristatum and A. marginale grow near each other under favorable conditions.

I have also found it recently (in October), within Middlesex Fells Reservation in Medford, growing under the conditions I have indicated; A. cristatum, A. marginale, and the hybrid near together, with plenty of A. marginale on contiguous ledges, and A. cristatum with its variety Clintonianum, A. Boottii and A. spinulosum scattered throughout a half-acre bit of swampy woodland.

Mr. Dodge notices a disposition on the part of this fern to produce abortive fronds, and I have found that it maintains this disposition under cultivation.

Aspidium simulatum, n. sp.— 1 to $3\frac{1}{2}^{ft}$ high; rootstock rhizomataceous, wide creeping, slender, brownish: fronds approximate along the extensions or clustered near the growing end; stipites 6 to 20^{in} long, stramineous, brownish at base, sparingly and deciduously scaly; laminæ 7 to 22^{in} long, 2 to $7\frac{1}{2}^{in}$ broad, oblong-lanceolate, gradually (or in the fertile fronds abruptly) narrowing to the long acuminate pinnatifid

apex, pinnately divided into from twelve to twenty pair of elliptic-lanceolate deeply pinnatifid sessile pinnæ, the lowermost pair as a rule introrse, apices acuminate, the obtuse oblique or oblong divisions entire or slightly toothed, the basal divisions of the lower pinnæ sometimes cut quite to the midrib, margins only partially revolute in fruit, but the whole pinna often conduplicate, texture herbaceous, surfaces, especially along the midribs, finely pubescent, the margins ciliately so, color varying, even in contiguous plants, from light to dark green, turning brown with age; rachis stramineous; venation simple, pinnate, rarely, in one abnormal plant only as far as I have seen, with a few of the lower veins once forked: sori much larger than in either of its congeners, indusia finely glandular, sporangia and spores brown when mature.

Habitat: Woodland swamps, thriving best in deep shade near cool moist hummocks, in beds of sphagnum. Originally collected in Seabrook, Essex co., Mass., about 1880, by Raynal Dodge of Newburyport, and more recently by him there, and also in Salisbury in several localities. Found growing abundantly on Indian Point, Georgetown, Maine, by myself in June, 1893, and in nearly full possession of a deep swamp in the Blue Hills Reservation, Quincy, Mass., Sept. 1894. It has also been collected in Purgatory Swamp, Dedham, Mass., by Judge J. R. Churchill, Sept., 1889, and there are two fronds from Stoneham, Mass., without date, in the collection of ferns bequeathed to the Appalachian Club by the late Mr. E. H. Hitchings. There is every probability of its having been collected many times as A. Thelypteris or A. Noveboracense and botanists should compare their specimens carefully.

This fern is intermediate between *A. Thelypteris* and *A. Noveboracense* showing resemblances to both. There are, however, few species in any one genus that are separated from one another by stronger and more distinctive characters than those which separate it from those two ferns, and the only explanation for its having so long escaped recognition is to be found in the fact that no one would think of looking for, or expect to find among the ferns a new species within the limits of the Manual, such varying forms as might be noticed naturally being referred to the nearest species.

Once attention is called to it, however, its recognition becomes comparatively easy and no one would a second time mistake it for A. Thelypteris, from which it is distinguished

by its simple venation, larger sori and glandular indusia; or for A. Noveboracense from which it is distinguishable by its Thelypteris-like fronds; and from both of which it is soon known by one of those indefinable graces of appearance that sometimes gives character and tone to a plant just as a certain air or carriage oftentimes distinguishes one person from another.

The new fern is also somewhat later than either A. Thelypteris or A. Noveboracense. On Indian Point I found the young crosiers just beginning to unfold while those of A. Thelypteris and A. Noveboracense were from six to eight inches high, and in the Quincy swamp matured plants were fresh and green when A. Noveboracense in the neighboring woodlands had become brown and yellow.

Unlike A. Thelypteris, too, this fern is at its best in the deep shade of cool swampy woodlands, growing naturally and fruiting heavily under conditions where A. Thelypteris is invariably weak growing and sterile.

Mr. Dodge's observations and my own agree very well not only on the points mentioned but in others to which he called my attention, and I am under great obligations to him for the pains he has taken to furnish me with so much valuable information as he has done.

The name which I have given to this fern was selected partly on account of its resemblance to A. Thelypteris and A. Noveboracense, but more especially on account of its remarkable simulation of a narrow woodland form of *Asplenium Filix-fœmina* which almost invariably has conduplicate pinnæ when growing in the sun.

I append the following synonyms of the two ferns here published for the use of those persons who reject Aspidium:

ASPIDIUM CRISTATUM × MARGINALE Davenport.

Dryopteris cristata × *marginalis*. *Nephrodium cristatum* × *marginale*. *Lastrea cristata* × *marginalis*.

ASPIDIUM SIMULATUM Davenport.

Dryopteris simulata. *Nephrodium simulatum*. *Lastrea simulata*.

NOTE.—It was my intention to have had some outline figures showing the resemblances, differences and special characters of these ferns and their related species, but unavoidable circumstances have compelled me to defer them until some other time.

Medford, Mass.